Internet **Of** **T**hings (**IoT**)
fattore abilitante nella città del futuro
XII GIORNATA DELLA RICERCA ANIE

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STMicroelectronics

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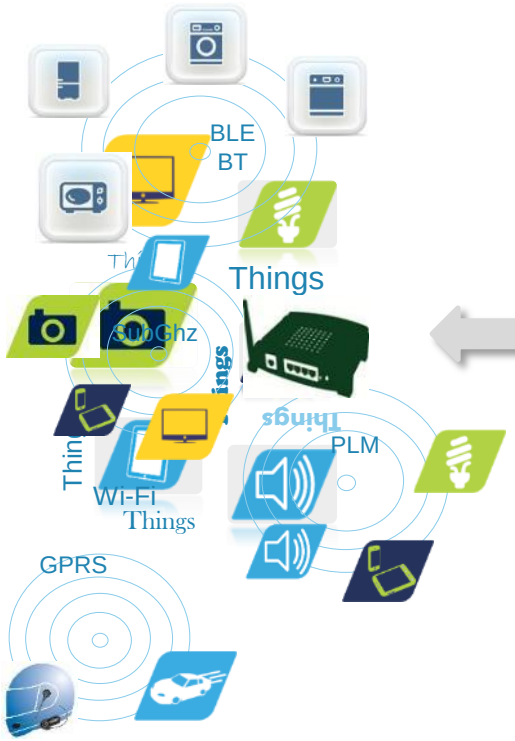
Agenda

- IoT Scenario
- Applications for Smart Cities
- IoT Enabling Technologies
- Conclusions

What is Internet Of Things?

Networks of Things



Internet

Applications

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Internet Of Things - Connectivity

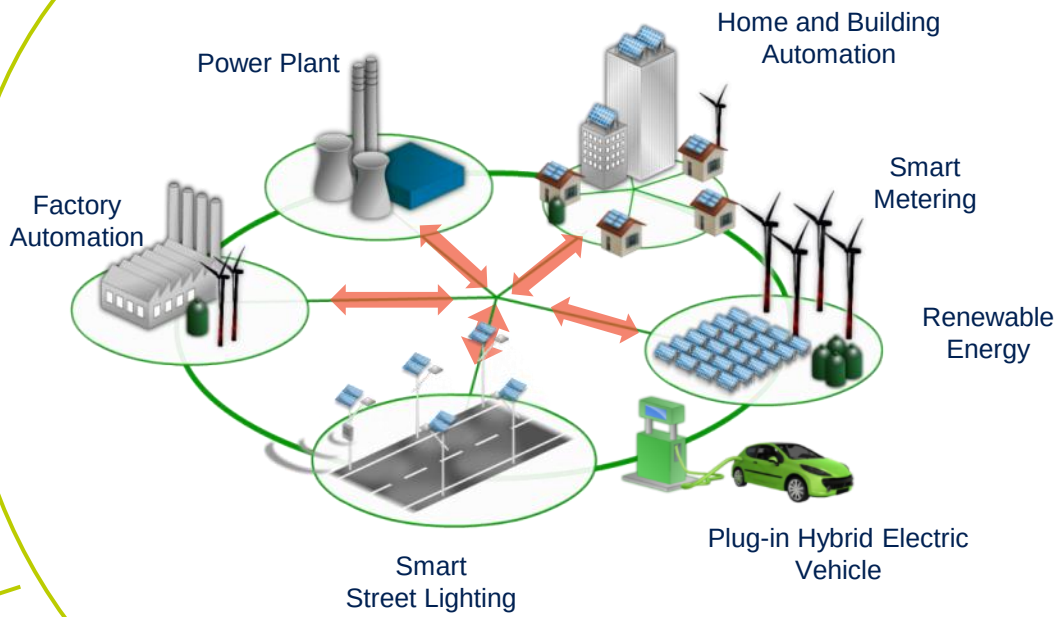
RFID
NFC

GSM
GPRS
M2M

RF
2.4 GHz

RF
Sub-GHz

PLC



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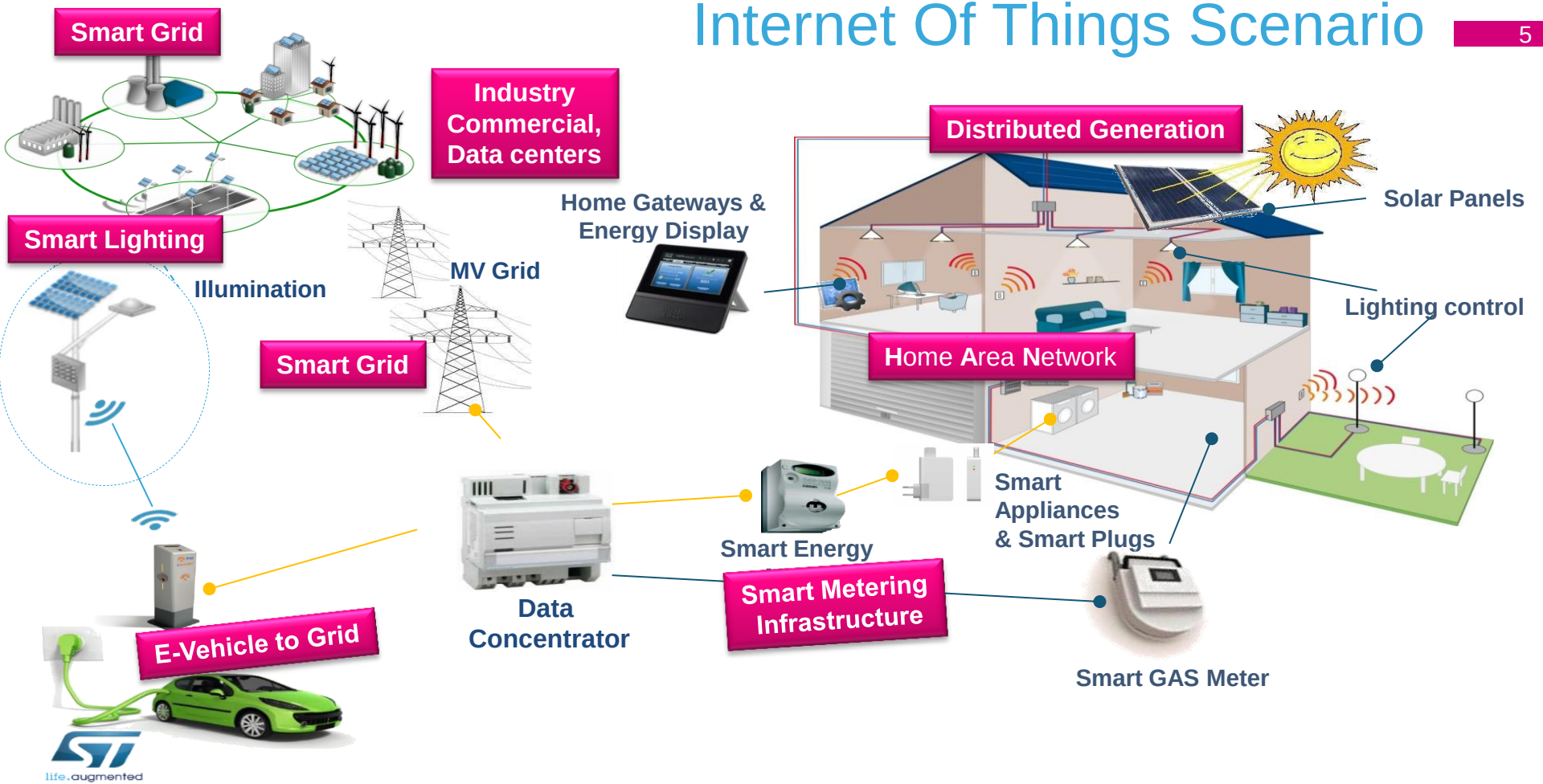
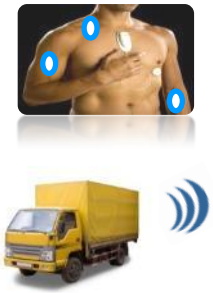
Internet Of Things Scenario

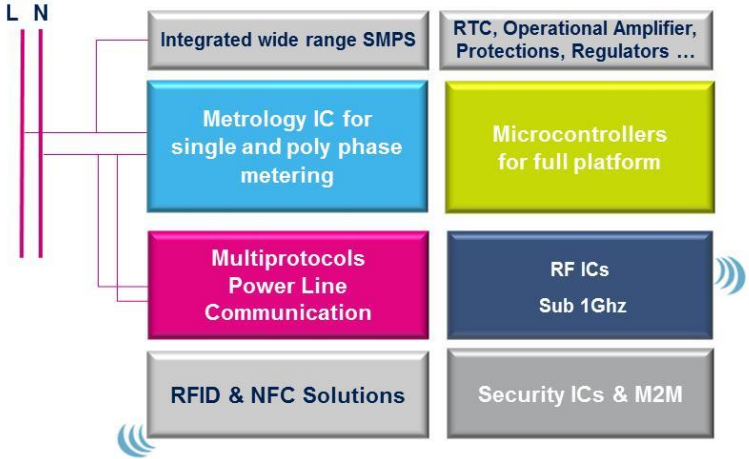


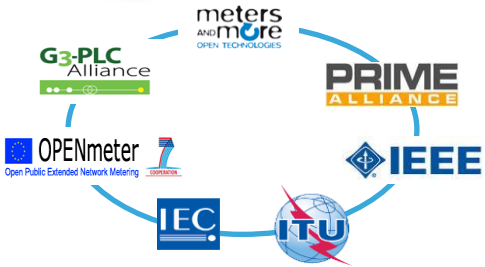
Internet Of Things Areas

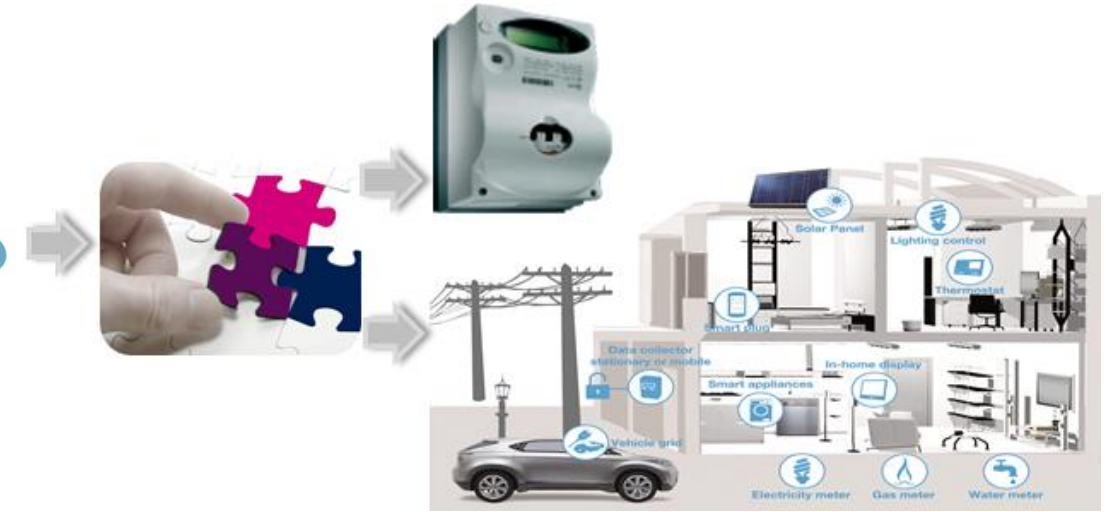
- Smart Cities
  - Smart Parking, Smart Lighting, …
- Smart Grid
  - Smart Metering, Photovoltaic, E-Mobility …
- Logistics
  - Fleet Management, Quality of shipment Indication,…
- Industrial Control:
  - M2M Application, Indoor Location, smart Agriculture, …
- Home & Building Automation:
  - Command and Control, Security, Video Surveillance, …
  - Home Appliance, Energy Monitoring, …
- eHealth
  - Patients Monitoring, Fall Detections



Smart Metering: the building block







PLC

RF
2.4 GHz

RF
Sub-GHz

*Being power meters connected to power grid, **Power Line Communication** is the most adopted technology for Smart Power Metering connectivity, while **Radio Frequency** is the preferred connectivity solution for battery powered meters (Water, Gas)*

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ST Leadership in Smart Power Metering

- Unique Smart Metering system know how and +20 years proven competence with key Smart Grid players worldwide
- Market Leader, 80% PLC-based smart meter market share(*)
- Leading in Power Line Communication Standard:

meters AND more OPEN TECHNOLOGIES

PRIME ALLIANCE

G3-PLC Alliance

IEEE

Enel L'ENERGIA CHE TI ASCOLTA.

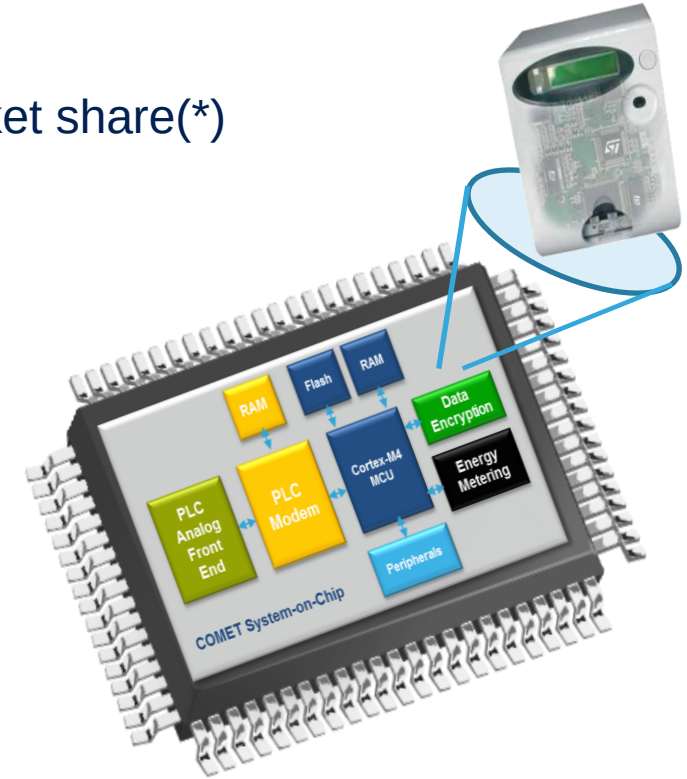
endesa Dirección General de

IBERDROLA

eRDF ÉLECTRICITÉ RÉSEAU DISTRIBUTION FRANCE

- The highest integrated and flexible SoC platform solutions on the market:

Multi-standard Smart Meter-on-Chip



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(*) ABI Research

from Smart Metering to IoE

"Internet of Energy"

Energy Producer

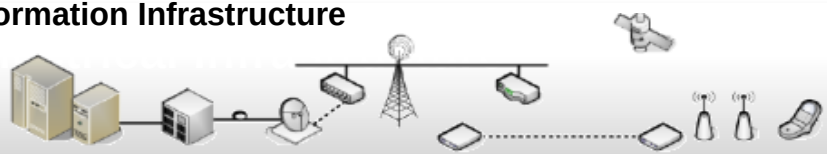
Traditional power plants

Solar generation

Wind farms

In-House Generation

Information Infrastructure



Megabytes of data to move…

Multi-Way Communications and Power Flow

…Megawatts of electricity efficiently

Electrical Infrastructure

Energy Consumer

Smart meters

Smart house

Plug-in vehicles

Industry

Communication is the key enabler of Smart Grid

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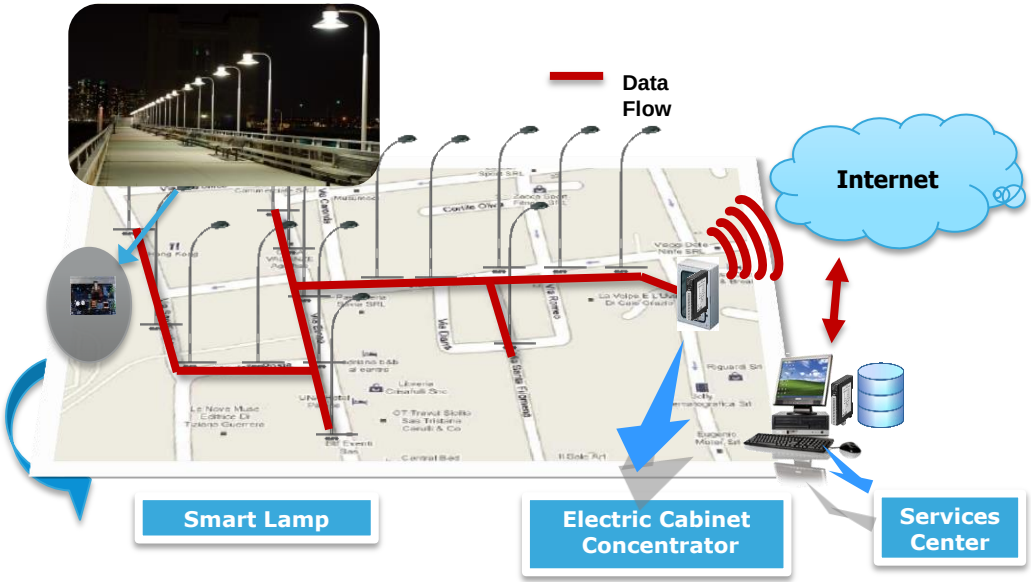
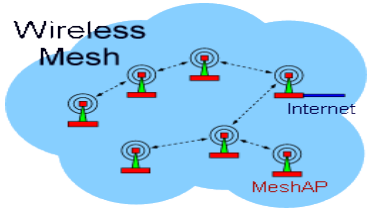
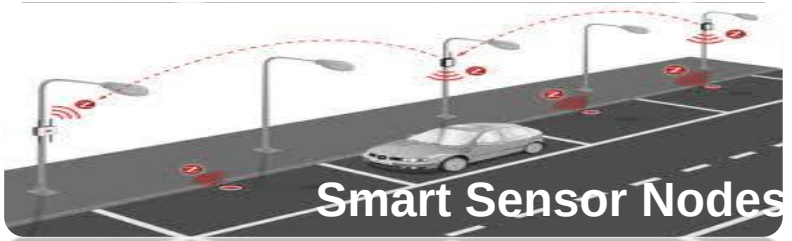
Smart Street Lighting and more

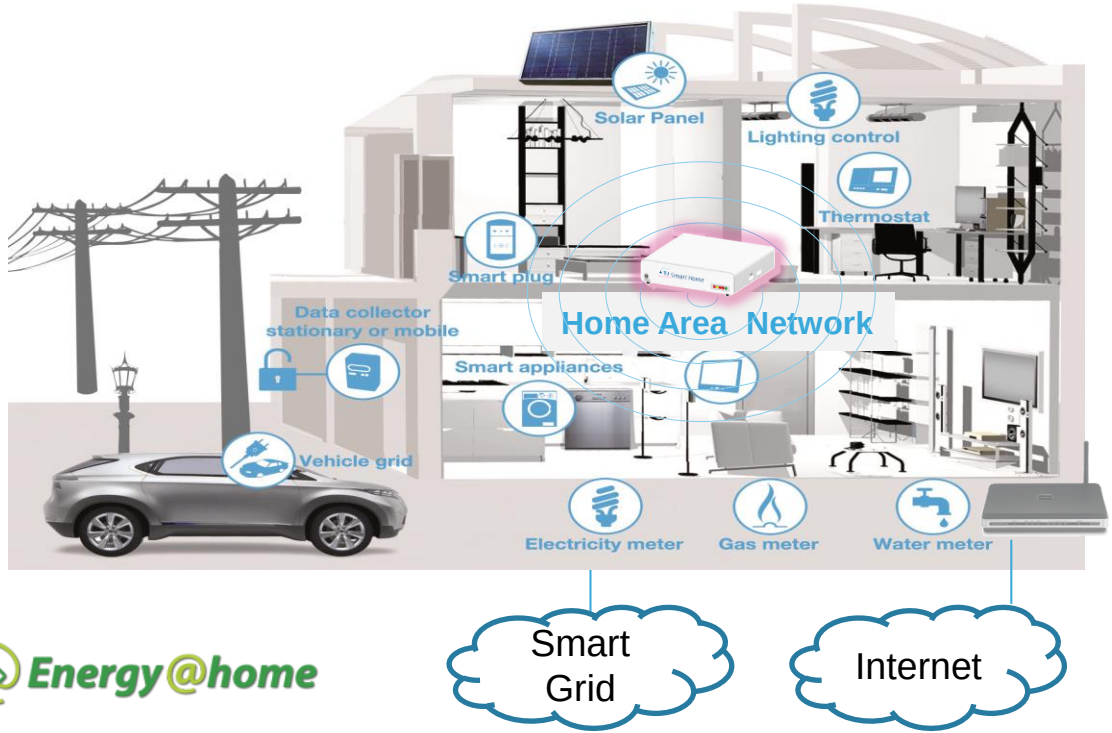


- ✓ Remote Dimming Control for Energy Savings
- ✓ On/Off timings adjustment
- ✓ Lamp failure monitoring
- ✓ Infrastructure evolution by integration of **Smart Sensor Nodes enabling new services**





Smart Home and Home Area Network



Smart Home Applications

- Home Energy Monitoring and Control
- Home Automation Monitoring and Control
- Assisted living and eldercare services
- Home Surveillance/Monitoring and IP Cameras Integration

Energy@home

Home Area Network: a key element in the Smart Home Architecture interconnecting «things» inside Home with Internet and Smart Grid

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Smart Home Gateway Roles

Confort

Lightning

Energy

Surveillance

SmartHome Gateway

Base-on ST STreamPlug

HomePlug, ZigBee , Z-Wave,..

Ethernet

Wi Fi

Control interface on tablet (HTML5)

Cloud Services

Home data gateway

The interface to control smart devices from a Tablet or laptop

The interface to the cloud and application services through your home gateway

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Enabling Technologies for Smart Cities

- Microcontroller
- Digital Power Controller
- Power Monitoring
- RF Sub 1 Ghz Transceiver
- Power Line Modem Communication
- Wi-Fi
- GPS/GNSS
- Tiny low power Real Time Clock
- MEMS Environnent Sensor
- Cool bypass switch
- Low Power precision RTC
- RFID / NFc

ST has the widest IC portfolio enable a smarter world based on:

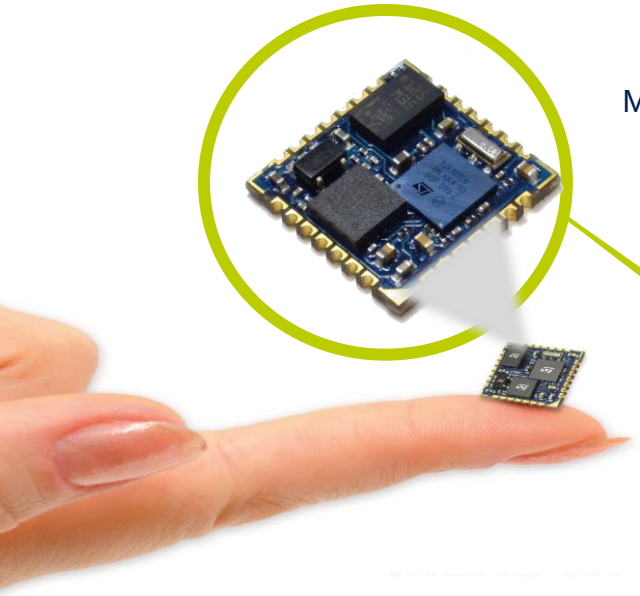
- Breaking through innovation
- System-on-chip approach
- State of the art silicon techn[illegible] for Smart, Power and Sensing

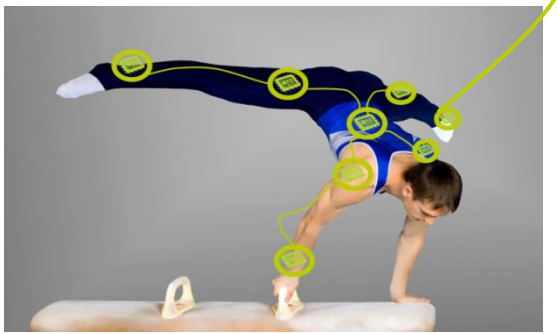
4 MEMS pillars

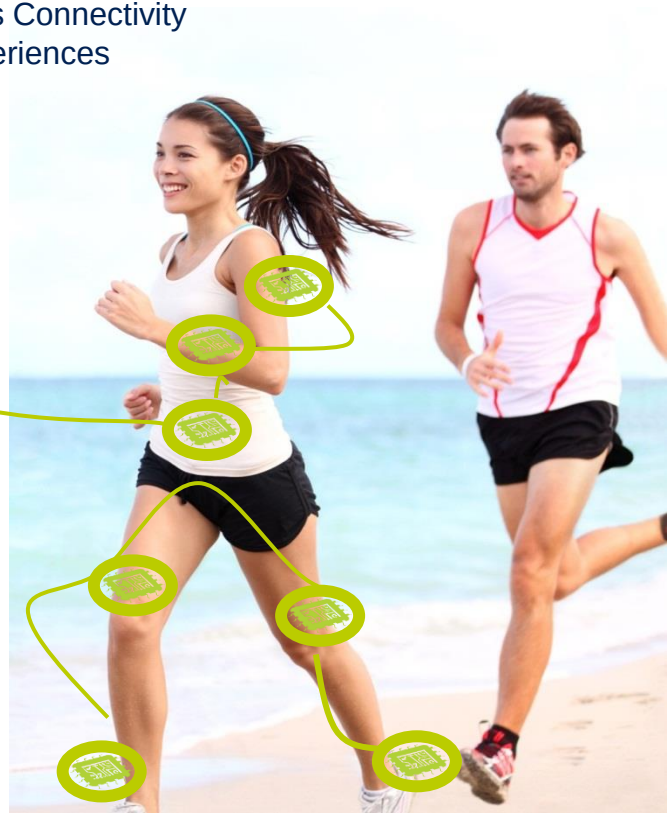
ST has a unique position in the semiconductor industry to create new Internet-Of-Things solutions

ST Wearable Solutions

Motion Sensors and Wireless Connectivity
enable new fitness experiences





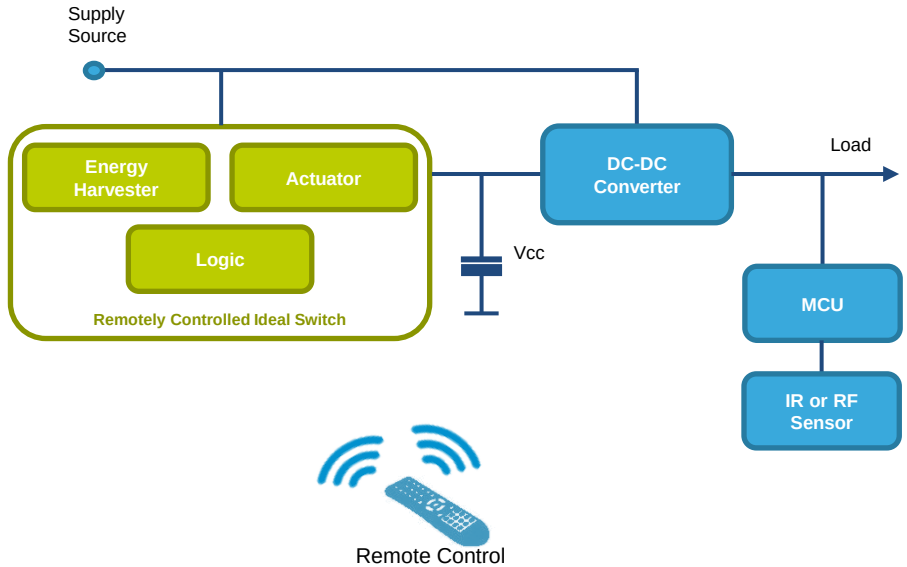


Zero Power Stand-by

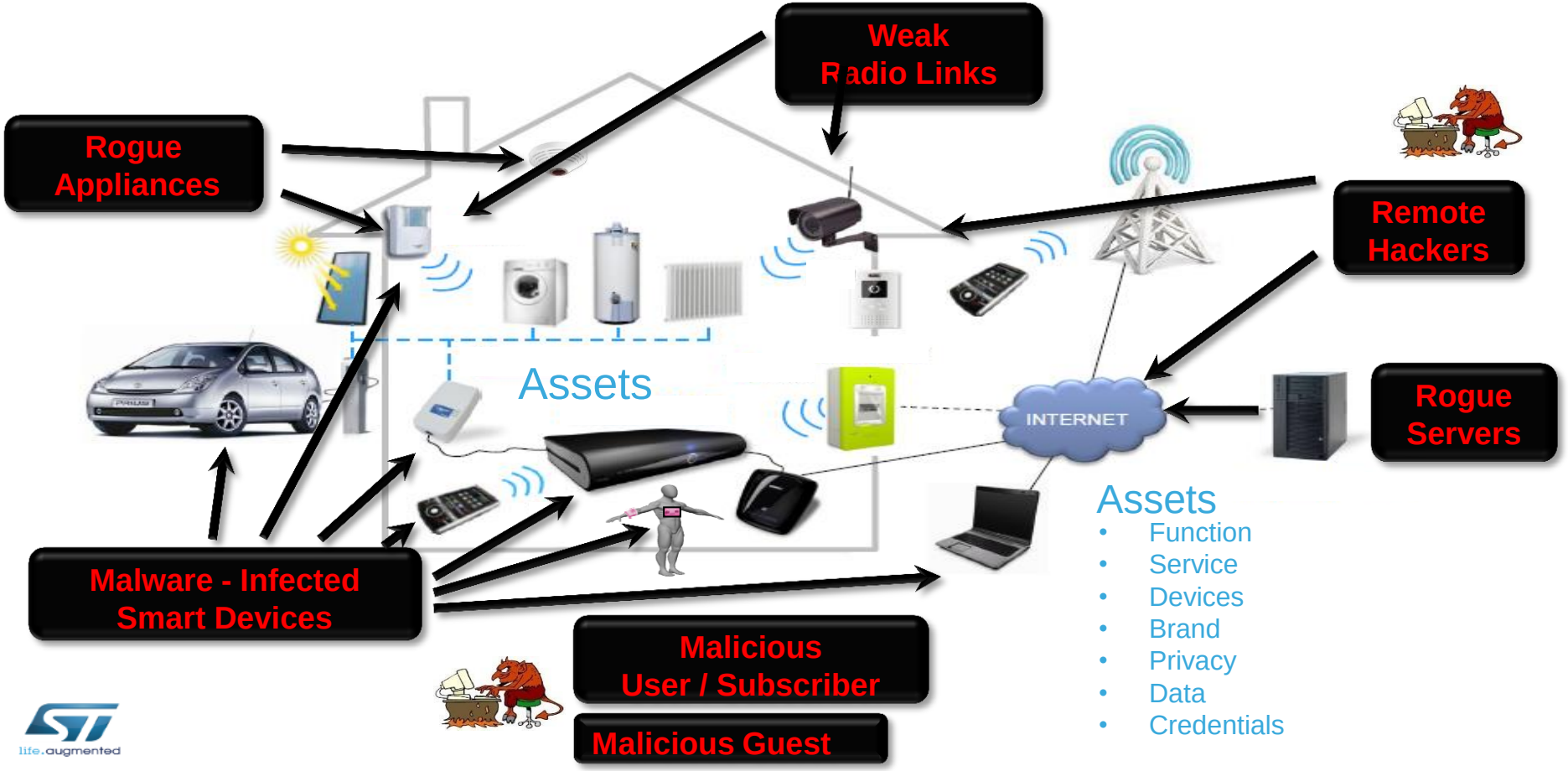
- Keeping Stand-by < 1W can reduce EU power consumption of 35TWh/y(*) by 2020
  (*) today's Denmark yearly electricity consumption
- In IoT, **electronic equipments** remote controlled **will growth exponentially**

Zero Power Standby is a "MUST" to fit energy saving targets

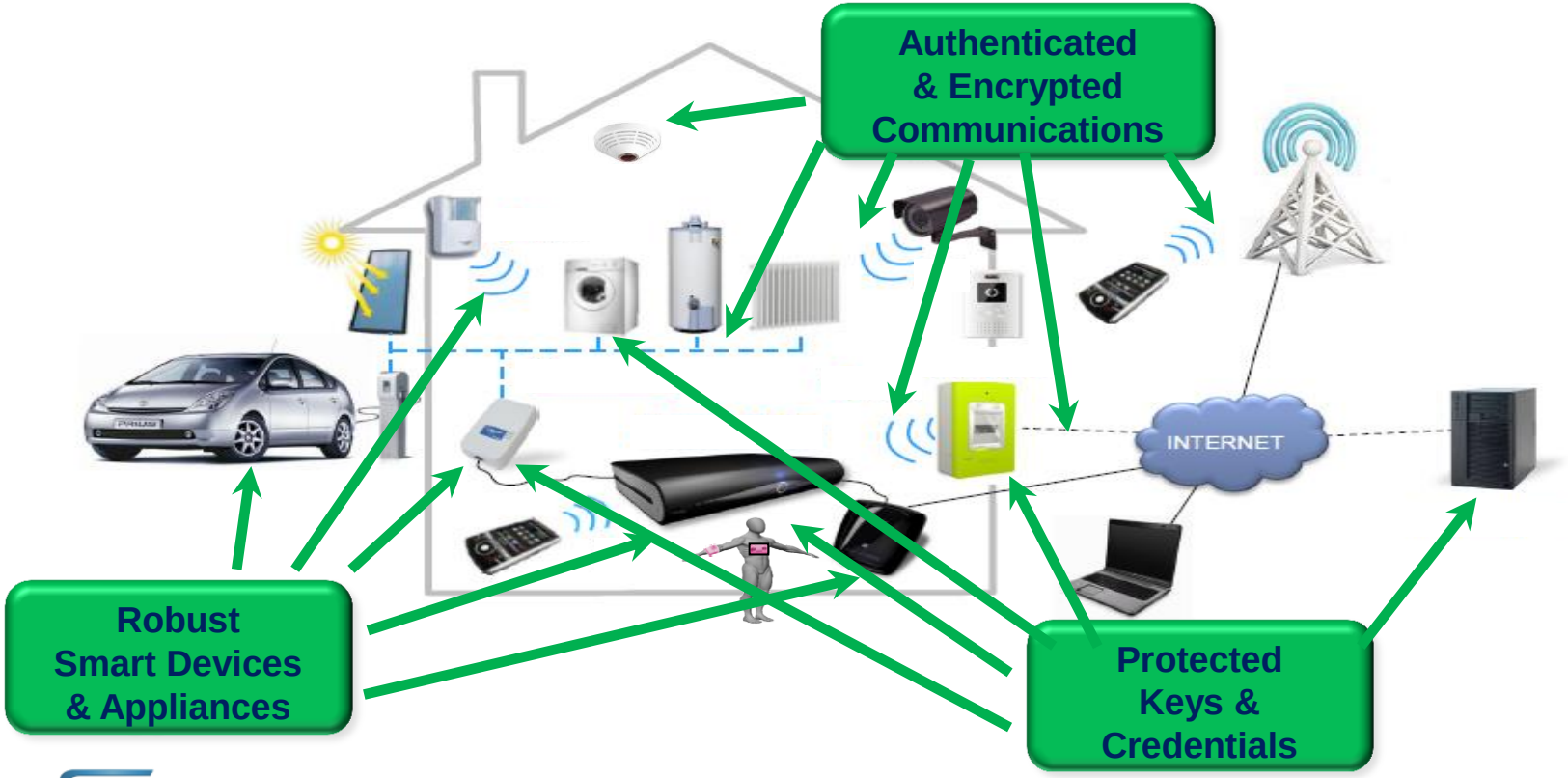
- **ST's break-through innovation for Zero Power Standby**
  - ✓ Based on the **Energy Harvesting**
  - ✓ Suitable for any IR/Rfremotely controlled sys



IoT and Security Issues: Threats & Vulnerabilities



IoT and Security: State-of-the-art solution



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Key technology provider for Internet-of-Things solutions enabling Smart Cities